

REMARKS

At the outset, applicant would like to thank Examiner Cintins for his time and consideration of the present application at the interview with the undersigned attorney. At the interview, the issues raised in the outstanding Official Action were discussed.

Claims 16-38 are pending in the present application. New claims 26-32 are directed to a method for extracting fat-soluble compounds from aqueous solutions containing *D. salina* cells and recite that the *D. salina* cells are ruptured to release fat-soluble compounds. Claims 26-32 have been drafted in accordance with the Examiner's suggestion at the interview. Indeed, applicant would like to thank the Examiner for his suggestion and believes that claims 26-32 are allowable. Claims 33-38 are directed to a method for extracting beta carotene from aqueous solutions containing *D. salina* cells. Support for new claims 26-38 may be found in the present specification at page 5, lines 9-10; page 5, line 27 to page 6, line 8; and Examples 1-3.

Claims 16-25 were rejected under 35 USC §103 as allegedly being obvious over CURTAIN et al. 4,554,390 in view of WEITZEN et al. 4,284,511. Applicant respectfully traverses this rejection.

In order to establish a *prima facie* case of obviousness, three basic criteria must be met:

(I) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;

(II) there must be a reasonable expectation of success;
and

(III) the cited reference (or references when combined) must teach or suggest all the recitations of the claims.

(I) No suggestion or motivation to combine

As the Examiner is aware, a suggestion or motivation to make the claimed combination must be found in the prior art, and not based on applicant's own disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP 2143. It is the applicant's position that this criteria is not met by the cited teachings and as such, a *prima facie* case of obviousness has not been established. Rather, applicant submits that the teaching in CURTAIN et al. is such that a skilled person would be directed not to combine it with WEITZEN et al. or, at the very least, that it is highly unlikely that the documents would be combined.

The basic technical premise underlying the methodology in CURTAIN et al. is to bind intact *D. salina* cells to a substrate to facilitate the isolation of beta carotene contained (and protected) therein in later method steps. The Examiner's attention is respectfully directed to the following passages:

- (i) abstract lines 4-10;
- (ii) column 1 lines 36-50 - teach that loss of cell structure (disintegration) is not desirable in the context of the CURTAIN et al. method;
- (iii) column 2 lines 45-49;
- (iv) column 2 line 55 through column 3 line 4; and
- (v) the examples (all have limited agitation when algae are contacted with substrate e.g. algae passed through columns (Examples 1, 3, 4, 5 and 6)), algae mixed with substrate by stirring (Examples 2, 7-14 and 17-18) or simply by addition with no agitation at all (Examples 15-16).

With this in mind, applicant submits that it is clear that CURTAIN et al. teach that it is essential to retain the physical structure of the algal cells.

In contrast, the objective of a fluidized bed such as that used in the present invention and WEITZEN et al. is to rupture cells passed through the bed. Thus, a skilled person seeking to modify or improve the process in CURTAIN et al. would not combine a fluidized bed (such as that in WEITZEN et al.) with the methodology of CURTAIN et al. It is simply inconsistent with the teaching of CURTAIN et al.

For example, and with particular reference to *D. salina* cells, it is important to note that such cells do not have a cell wall and are basically a fragile unicellular algae. Thus, if the intention is to retain cell structure (an essential part of the

teaching in CURTAIN et al.), a skilled person would not seek to combine a fluidized bed with the method taught in CURTAIN et al. because they would have expected a fluidized bed to rupture the cells. This would be expected to lead to the loss of the target substance and drastically reduce yields as opposed to improving the process.

Indeed, particular aspects of fluidized bed reactors that a skilled person would have considered incompatible with an intention to maintain cell structure are as follows:

(a) generally the feed stream is delivered into a fluidized bed reactor by pumping and this degree of agitation would rupture or otherwise physically damage the cells;

(b) the level of agitation within a fluidized bed reactor would place physical stresses on the cells that would cause cell rupture;

(c) the level of agitation in combination with the physical friction/contact placed on the cells through contact with the substrate (such as magnetite) in the environment of a fluidized bed would rupture the cells; and

(d) with particular reference to readily oxidizable target substances such as carotenoids, fluidized beds are generally high oxygen environments and therefore there would be a concern that upon rupture of the cells oxidation of the target substance would occur resulting in drastically reduced yields.

Thus, in view of the above, applicant believes the proposed combination teaches away from the claimed invention.

Applicant also submits that the disclosure of CURTAIN et al. itself counters the Examiner's contention that the documents would have been combined and modified. In this regard, CURTAIN et al. is a complete teaching of a method of isolating beta carotene from *D. salina* and describes a number of methods embodying the invention (including 18 examples). The document specifically states that an advantage of the invention is that it operates in a manner:

"....whereby the algae can be rapidly and economically separated and recovered from the saline medium in which they have been grown." [see column 2, lines 47-49]

The various exemplified methods resulted in beta carotene resulted in yields of between 70% (Example 2) to 84% (Example 16) and applicant submits that at the priority date of the present application there was no motivation for a skilled person to seek out an improved method of isolating beta carotene with higher yields than those described by CURTAIN et al. In this regard, the large number of examples tested various parameters which teaches a skilled person that a degree of trial and error was carried out by the inventor in optimizing the separation process. In addition, the wide range of examples indicates to a skilled person that the CURTAIN et al. process methodology was extensively trailed, tested and optimized. There would be no

motivation for a skilled person to seek to improve the process further by trialing and testing other modifications because the skilled person would not have expected to be able to improve the yields further.

Thus, applicant submits that CURTAIN et al., on its face, teaches one of ordinary skill that the separation methods disclosed therein are sufficient to produce a viable separation of beta carotene, without any further adaptation, and thus represents a complete teaching to a skilled person.

Moreover, as CURTAIN et al. provide no mention whatsoever of a fluidized bed, one of skill in the art would not have been motivated to perform any kind of experimentation, routine or otherwise, to determine whether the methods of CURTAIN et al. could or should be adapted using the disclosure of WEITZEN et al. The only motivation or suggestion to perform the steps in claim 16 of the present application arises out of the present specification. However, as the Examiner is aware, it is impermissible to use an applicant's own disclosure to find motivation to combine and modify publications to obtain a claimed invention. In other words, hindsight reconstruction is impermissible.

Nothing in CURTAIN et al. would suggest or motivate the skilled artisan to ensure that the methods described therein should be modified by the inclusion of a fluidized bed. Rather, as applicant has set out above, CURTAIN et al. teach away from the

use of a fluidized bed because the publication requires intact cells to be bound to the substrate.

In the absence of such a suggestion or motivation, applicant submits that the objection fails the first requirement for obviousness because the only suggestion or motivation to perform such steps is found in applicant's own disclosure and not in the prior art. For these reasons alone, applicant respectfully submits that the articulated rejection fails to establish a *prima facie* case of obviousness. However, as discussed below, there are even further reasons as to why the combination of CURTAIN et al. and WEITZEN et al. fails to render obvious the claimed compositions.

Non-analogous art

With regard to rejections under 35 USC §103, the Examiner is respectfully reminded that it is incumbent on the Patent Office to provide evidence which as a whole shows that the legal determination sought to be proved (*i.e.*, the reference teachings establish a *prima facie* case of obviousness) is more probable than not. It is well established that in order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir.

1992). In the present case, the Examiner has sought to combine two references from non-analogous arts.

The field of endeavor of the presently claimed invention is algal biotechnology and more particularly the isolation of beta carotene from *D. salina*. The particular problem addressed by the present invention is that it seeks to achieve improved yields of beta carotene from *D. salina*. The Examiner has relied on WEITZEN et al. in combination with the primary reference to assert obviousness of the claims. However, the field of endeavor of WEITZEN et al. is in the separation of chemicals, such as heavy metals, from process streams. For instance, the example describes the isolation of gold from a cyanide leachate.

Thus, applicant submits that the two fields of endeavor are non-analogous. One of skill in the art attempting to produce increased yields of beta carotene from *D. salina* would not look to inorganic mineral separation techniques to facilitate such increased yields.

Applicant submits that the combination of CURTAIN et al. and WEITZEN et al. can only be arrived at through the use of the applicant's own disclosure as a roadmap to identify disparate, and unconnected disclosures in the art. This amounts to an impermissible hindsight construction of an obviousness rejection. Indeed, as the Examiner is aware, the mere fact that the reference can be modified is not sufficient to establish a *prima facie* case

of obviousness. *In re Mills*, 16 USPQ2d 1430 (Fed. Cir. 1990) (see MPEP 2143.01).

(II) No expectation of success

In addition, a skilled person would not have been motivated to combine CURTAIN et al. and WEITZEN et al., as there was no expectation of success from such a combination. The requirement to maintain intact cells, the high yields obtained from the process in CURTAIN et al. and the fact that the processes in CURTAIN et al. appear to have been widely trialed and tested mean that there is also no expectation of success in seeking to improve the process further by process modifications. This further reduces the motivation to combine CURTAIN et al. and WEITZEN et al.

Thus, applicant submits that the combination of the cited references fails to render obvious the claimed invention as there is no motivation or suggestion to combine the teachings of the cited references. Furthermore, even if one skilled in the art was aware of both references, that individual would not have any expectation of success of achieving the claimed invention because that individual would be well aware that the fluidized bed would rupture the cells and he would not consider the secondary reference reasonably pertinent to the field of isolating beta carotene.

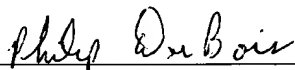
In view of the present amendment and the foregoing remarks, therefore, it is believed that this application is now in condition for allowance, with claims 26-38, as presented. Allowance and passage to issue on that basis are accordingly respectfully requested.

Please charge the fee of \$27 for the three extra claims of any type added herewith, to Deposit Account No. 25-0120.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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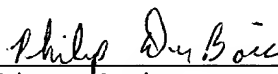
In view of the present amendment and the future of the remarks, therefore, it is believed that this application is now in condition for allowance, with claims 26-38, as presented. Allowance and passage to issue on that basis are accordingly respectfully requested.

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